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Sick of being unemployed? Interactions between unemployment and sickness insurance in Sweden

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Sick of being unemployed? Interactions between unemployment and sickness insurance in Sweden[♣]

by

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Abstract

This paper examines the incentive effects caused by the interactions between unemployment insurance (UI) and sickness insurance (SI), two important components of Sweden's social insurance system. There are two main topics of interest: how the sickness report rate and the length of the subsequent sick period among the unemployed are affected by (*i*) the limit of 300 workdays for UI benefits, and (*ii*) the difference in maximum compensation between UI and SI benefits. Results obtained by duration analysis suggest that sick reports increase as the UI benefit expiration date approaches. There is also evidence of an incentive effect on the sick-report rate because SI offers greater compensation than UI. But neither of these factors seems to have a significant effect on the length of the sick period.

Keywords: Unemployment insurance, sickness insurance, health, duration analysis, discrete hazard models.

JEL-Code: C41, J64, J65, H55, I18

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1 Introduction

The sickness insurance (SI) expenses have increased drastically in Sweden in the late 1990s, caused by more as well as longer absence periods due to sickness. Consequently, the public debate has been heated about reasons for the absence and measures for preventing the rising figures. The debate's focus has all but exclusively been on the employed, presumably because most of the expenses are caused by an employee's absence from work. Economic research on absence from work due to sickness in Sweden points to the same findings. Examples of studies conducted on employee absenteeism include: Broström et al. (1998); Cassel et al. (1996); Edgerton and Wells (2000); Henrekson and Persson (2001); and Johansson and Palme (1996 and 2000). Currie and Madrian (1999) summarise international research on the subject.

But the recent rise in absence from work is far from the only question of interest in this context. Besides employed workers, unemployed people who report in sick are also able to receive SI benefits. According to government estimates for 1999, unemployed people, including students, reported about 20 % of the total sick days. Interactions between the SI system and other components of the social insurance system are very important when examining the behaviour of this group.

This paper examines sick periods among the unemployed, and particularly incentive effects caused by interactions between the unemployment insurance (UI) and SI systems. The interplay between various social insurance programs is a largely unexplored research area inside and outside Sweden. For example, Krueger and Meyer (2001) point out that the overlap among insurance programs is a fruitful area for future research in the US and Europe.

Institutional settings, specific for every country, define which questions are interesting to examine. In Sweden, for example, the designs of UI and SI imply two potential incentive effects. First, UI and SI benefits are based on the employee's wages before unemployment, up to a ceiling above which the benefit is constant. For most of the 1990s, the replacement ratio has been the same in both systems, whereas the ceiling for SI benefits has been about 35-40 % higher than for UI benefits. Thus an unemployed individual, who earned a high wage while employed, receives greater benefits from SI than UI and can thus benefit from reporting sick. To determine whether or not the unemployed exploit this possibility, this paper examines the evolution of sick-report rates and the length of subsequent sick periods for *high-wage* earners and *low-wage* earners, who are unemployed.

Second, for the majority of the unemployed, the UI benefit period is limited to 300 workdays. After that, the benefit expires. While receiving SI benefits, unemployed people *reserve* their UI benefits, thus postponing the expiration date. Previous studies on UI benefits in Sweden indicate that as the end of the 300 workday limit approaches, the transition rate from unemployment to employment increases (see Carling *et al*, 1996). In this study I examine whether the UI time limit – combined with the ability to report sick to lengthen the maximum compensation period – has an effect on reported sicknesses among the unemployed.

The remainder of this paper is organised like this: section 2 presents the central features of Sweden's UI and SI systems; section 3 discusses theoretical issues; section 4 presents the data; section 5 shows the empirical strategy and results; and section 6 contains concluding remarks.

2 UI and SI benefits in Sweden

The benefits for UI and SI systems are income related. UI consists of two parts: a fixed *basic amount* of compensation and an *income-related* amount that is determined by previous earnings. To qualify for the income-related benefit, a person must comply with the *membership condition* and the *work condition*. To fulfil the *membership condition,* the person must have been a member of an UI fund for at least a year before unemployment, whereas the *work condition* defines the minimum number of days the person must have worked before unemployment.[1] If unemployed persons comply with just one of these conditions, they only receive the basic amount, which during the 1998-1999 study period was SEK 240 per working day (SEK 5,280 per month). Both the replacement ratio and the ceiling of the income-related UI benefits have changed several times during the 1990s, but during the 1998-1999 study period, the compensation was 80 % of previous earnings up to a ceiling of 80 % of SEK 15,950 per month.

[1] The *work condition* requires that before unemployment, the person has worked at least 70 hours per month, for six months, within a 12-month period. Or the person could qualify for the condition by working at least 450 hours during a continuous six-month period.

The SI system provides income-related compensation in case of sickness. For employed workers, the employer is responsible for the compensation of the first 14 days of sickness (28 days until 31 March 1998); after that, regional social insurance offices take over. Unemployed people are also eligible for SI as long as they are registered at local employment offices as job seekers and if they were previously employed.[2] For the unemployed, the regional social insurance offices pay out the SI benefits from the beginning. For both the employed and unemployed, the first sick day is not compensated.[3] To receive additional compensation, the insured person must show a doctor's certificate after seven days and then again after four weeks. Given that the person does this, there is no formal time limit for the compensation.

For most of the 1990s, the replacement ratio of SI has been the same as in the UI system, whereas the ceiling has consistently been much higher: in 1998, it was 80 % of SEK 22,750 per month, and in 1999, it was 80 % of SEK 23,250 per month.[4] Figure 1 illustrates the structure of the two benefits. Unequal ceilings imply that an unemployed person, with a previous monthly wage above SEK 15,950, benefits from reporting sick. So the higher the wages while employed, the greater the difference between UI and SI benefits while unemployed.[5] How much the unemployed gains by reporting sick also depends on the length of the subsequent sick period due to the uncompensated first sick day. But for simplicity, Figure 1 does not account for the uncompensated day.

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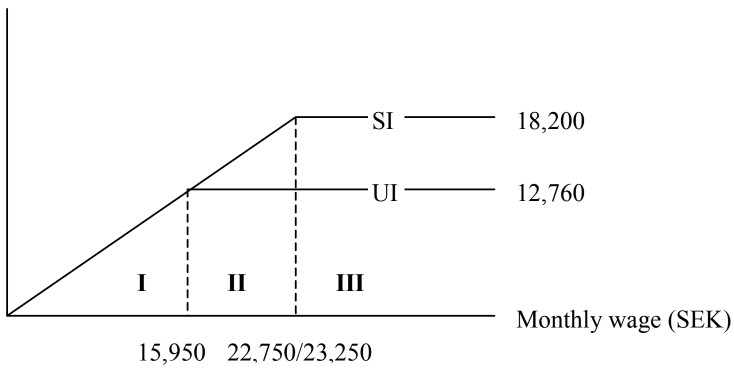
[2] Compared to the work condition of UI, the rules according to compensation from SI are not as strict, because it is required that employment before the unemployment period was *intended to continue*. In principle, even employment for one month might qualify the unemployed person for SI benefits, even though the regional social insurance offices are recommended to claim regular earnings for at least one year before unemployment (Telephone conversation with Ann-Sofie Åkerman, social insurance office Uppsala, 16 February 2001).

[3] If the previous SI period ended less than a week before, or if the person has a chronic illness and is subsequently covered by a special condition, he or she receives SI compensation on the first sick day.

[4] Formally, the maximum level of SI is defined by the *base amount*, a measure generally used as an index for social insurance. The income ceiling for SI is 7.5 times the base amount, which was SEK 36,400 in 1998 and SEK 37,200 in 1999.

[5] Many workers are provided with (often by their employer) various private agreements that increase their actual UI or SI compensation. But it is impossible to obtain information about these agreements, and thus their existence is ignored in this study.

Figure 1 UI and SI benefits in the late 1990s



Note: SEK 100 equals to about € 10.9 (February 2002). The limit for maximum SI benefits was SEK 22,750 in 1998 and SEK 23,250 in 1999.

Moreover, the UI benefits are time-limited. After qualifying for UI, an unemployed person up to age 56 is guaranteed to receive benefits for a maximum of 60 weeks (300 workdays), either continuously or with breaks in the unemployment period. Unemployed people, age 57 and older (age 55 and older until 31 December 1997), receive benefits for 450 workdays.[6] In other words, in the beginning of the very first unemployment period, the person has 300 (450) benefit days to receive.

But very few are continuously unemployed that long; unemployment is often interrupted by for example periods of work and studies. In the beginning of a second (or subsequent) unemployment period, the number of benefit days depends on how long the break has been, and whether the person has worked during the break. If the break does not exceed a year, and the person has not worked enough to fulfil the work condition again, then he or she is entitled to what is left of the 300 (450) days after the first unemployment period. If the person has fulfilled the work condition during the break, the number of benefit days is again 300 (450). Finally, if the break exceeds a year, and the person has not fulfilled the work condition, he or she is no longer entitled to UI benefits.[7]

[6] The UI system was reformed again in February 2001, and today nobody is entitled to 450 days.

[7] It is allowed to have a longer break than one year if the person has, for example, been on maternity leave or studied full-time.

Until February 2001, it was possible to use active labour market programmes as a measure to qualify the unemployed for new benefit periods. Programmes that lasted for at least six months were enough to comply with the working condition, and according to results in Sianesi (2001), this praxis was actually used at local unemployment offices. Nevertheless, the time limit may have an effect on the behaviour of unemployed people.

3 Theoretical issues

In the economic literature, absence from work has been traditionally analysed within the framework of a labour supply model. Absence from work emerges in a situation where the employment contract obliges the worker to supply a certain amount of labour that exceeds the worker's optimal labour supply, determined by utility maximisation over income and leisure, subject to income and time constraints. Absence is associated with a cost in terms of lost income. Examples of such models and empirical applications are provided by Allen (1981), Barmby, Orme and Treble (1991), Barmby, Sessions and Treble (1994) and Brown and Sessions (1996).

In the labour supply framework, the worker's health is assumed to affect his or her marginal rate of substitution between income and leisure: the more sick the worker, the higher the value of leisure relative to income. Barmby *et al* (1994) incorporate health explicitly in their theoretical model by including an index of sickness in the utility function of the worker: higher values of the index imply higher level of sickness. The index, denoted by σ, is assumed to be a random variable. In other words, the worker is exposed to health shocks that entail a new level of sickness, and thus a new utility maximisation problem.

Given certain (realistic) assumptions on the form of the utility function, a solution to the utility maximisation problem implies a unique value of sickness, σ^*, for which the worker is indifferent between work attendance and absence, given the costs and benefits associated with the two states. For levels of sickness above this *reservation level of sickness* the worker optimises his or her utility by staying at home.

Generally, such a framework should be applicable even to the unemployed: a transition to SI benefits is associated with more leisure than collecting UI benefits, since the unemployed worker is obliged to put effort on job search while on UI but not on SI benefits. If so, then a *reservation level of sickness* can be derived for the unemployed worker determining the value of sickness for which he or she is indifferent between UI and SI benefits.

The effect of different benefit ceilings on the unemployed worker's tendency to switch to and stay on SI benefits can then be analysed in terms of the *reservations level of sickness*. In the Barmby *et al* (1994) model, it is straightforward to show that an increase in the sick pay lowers the *reservation level of sickness* leading to more absence from work. A higher sick pay implies a lower cost associated with absence and alters thus the worker's budget constraint. Given that leisure is a normal good, this leads to a decrease in the optimal labour supply of the worker. Similarly, an increase in SI benefits relative to UI benefits lowers the unemployed worker's *supply of job search*, implying higher probability to switch to and stay on SI benefits.

The effect of time-limited UI benefits can be considered by combining the model of Barmby et al (1994) with the standard job search model by Mortensen (1977).[8] One of the most important implications derived from the Mortensen model is that the unemployed worker's reservation wage declines as the worker approaches the date of benefit expiration, implying a rise in the exit rate to employment. This is due to a change in the relative value of unemployment: The value decreases as the elapsed duration of the benefit period increases, whereas the value of employment remains the same.[9]

So a general implication is that the closer the unemployed worker is to UI benefit expiration, the more attractive all other states in relation to unemployment become. Consequently, when the unemployed worker is exposed to health shocks as in the Barmby *et al* model, and has the opportunity to reserve UI benefit days and avoid job search by collecting SI benefits, it reasonable to expect that the *reservation level of sickness* decreases as the worker approaches the expiration date, implying a higher probability to switch to and stay on SI benefits.

In sum, combining the results from the theories of absenteeism and job search, we would expect an increase in the SI benefits in relation to UI benefits

[8] For modifications of the Mortensen (1977) model, see for example Burdett (1979), Mortensen (1990) and van den Berg (1990, 1994).

[9] Carling et al (1996) incorporate labour market programmes into the model and show that the size of the effect on the exit rate to employment now depends on how the unemployed value the programmes. The empirical evidence for Sweden indicates that even in the presence of such programmes, exit rate to employment increases as the unemployed approach the date for UI benefit expiration.

to have a positive effect on the unemployed workers' probability of a transition from UI to SI, and on the duration of the subsequent SI period. Moreover, we would expect the transition rates from UI to SI, as well as the duration of SI spells, to be higher for workers that are close to UI benefit expiration.

4 Data and sampling

4.1 Data

Data for the empirical analysis are obtained from LINDA (stands for longitudinal individual database), which is a register-based database with about 300,000 individuals (for a detailed description of LINDA, see Edin *et al*, 2001). The two main data sources for this analysis (both of which are in LINDA) are unemployment period data (AKSTAT) from unemployment insurance funds, and sickness period register (*sjukfallsregister*, SFR) from the National Social Insurance Board. Demographic variables collected from other data sources are also included in LINDA.

AKSTAT[10] consists of four tables per calendar year that contain information on all benefit payment decisions for unemployed people who are entitled to either basic-amount or income-related UI benefits.[11] Each UI benefit payment, which is paid out weekly, is regulated by two decisions: one determines the size of the benefit, based on previous wages; the other determines the duration of the benefit. In principle, each insured, unemployed person is entitled to receive compensation for 300 workdays (450 workdays for people ages 57 or older). But, these benefit days can be paid out for several unconnected spells of unemployment, which often results in a new spell starting with less than 300 (450) workdays.

Moreover, the benefit level may also change between two unemployment spells, given that the person has worked and earned a different wage. So at the

[10] A National Labour Market Board database: the AKSTAT contains administrative information taken from the various unemployment benefit funds. This includes information on funds that are paying unemployment benefits, the amounts paid, and wages from previous employment. AKSTAT was established in 1994.

[11] Most benefit payments in AKSTAT refer to UI benefit payments, either income-related or basic-amount, for those people who are openly unemployed. In addition, UI funds pay allowances for some of the active labour market programmes available to the unemployed. But during the study period, the extent of these programmes was very small.

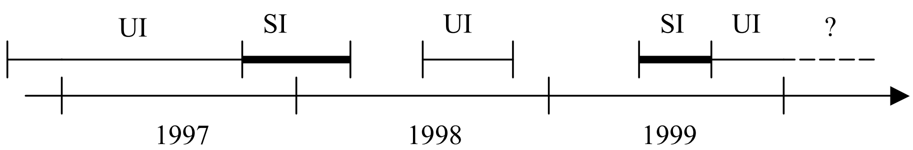
start of an unemployment period, to determine the number of remaining days until the UI benefits expire, all previous periods that belong to the same 300 (450) workdays' decision must be traced back to the date of the decision. This data must then be combined with information on the actual size of the benefit's decision to determine the amount of the UI benefit during the unemployment period in question.

SFR includes records on SI benefits for all individuals who are entitled to them, including employed and unemployed people. For each sick report, start and end dates are included along with information on the *type* and *extent* of the benefit. Regular SI benefits for illnesses, rehabilitation benefits, and benefits for preventive care are examples of the *type* of benefit, whereas the *extent* defines whether or not the benefit is paid out on a full-time or part-time basis. Most periods are for full-time, regular SI benefits for illnesses. The data also include information on the previous wage, which defines the level of the SI benefit. But the data do *not* include additional detailed information on medical diagnoses or other indications on the state of the illnesses.

Combining AKSTAT with SFR results in a database with unemployment spells for the 1994-1997 period, and both UI and SI spells for the 1997-1999 period. Figure 2 illustrates an example. The gaps in the figure imply some activity other than UI or SI, for example, work, studies or active labour market programmes, but no additional information is provided in the data.[12] Of course, not all of the unemployed are observed sick during the study period: each year, about 20-23 % of about 30,000 unemployed also have a SI spell during the same year.

[12] Labour market programmes could, in principle, be observed by combining the data with records from the local employment offices (HÄNDEL). But attempts to combine these data sets have revealed that they do not match well. Even if combined with HÄNDEL, the data would still not include, e.g., employment spells, and thus for the purpose of this study, the cost of combining the data – the loss of observations that do not match – is considered higher than the benefit.

Figure 2 Example of UI and SI spells in the data



4.2 Sampling procedure

All people who begin an open unemployment spell with UI benefits between January 1998 and August 1999 were selected from AKSTAT.[13] Thus SI and UI benefit payments during 1997 are used as control variables to eliminate heterogeneity bias in the empirical analysis.[14] These people are then followed from the start of the UI spell until their transition to SI benefits. For simplicity, all SI payments are considered the same, irrespective of the type or extent of the payment.

UI spells that end for some reason other than sickness are treated as censored – as the 1998 UI spell of the example person demonstrates in Figure 2. The first part of the analysis focuses on the probability of changing from UI to SI benefits. In the second part, the sub-sample of people who have switched to SI benefits is then used to study the probability of people returning to UI benefits.

Collecting the inflow to UI benefits between January 1998 and August 1999 results in a sample size of 17,951 individuals, out of which 829 (4.6 %) changed from UI to SI benefits. But some of the observations are excluded, either due to deficient data quality or to reduce heterogeneity in the sample. For example, the people entitled to 450 workdays of UI compensation are excluded. Differences in the maximum duration of benefits may have an effect

[13] The UI benefit data are reported weekly, and thus the exact inflow is restricted to 5 January 1998 – 3 September 1999. Appendix A contains a detailed description of the sampling procedure.

[14] To be strict, conditioning on previous UI and SI benefit periods and treating them as predetermined variables is valid only in the absence of unobservable heterogeneity (for example in terms of health) among the individuals. Section 5 describes how the identification of the expiration effect and the effect of various ceilings takes into account the potential systematic health differences among individuals.

on the behaviour of the unemployed. Moreover, the behaviour of people close to the age of retirement may differ from the behaviour of younger people due to different choices concerning, for example, sickness pensions and early retirement pensions.

Eventually, the sample size is reduced to 12,538 UI spells (sample A in Table 1), including 575 transitions to SI benefits. The transition from SI to UI is studied with a sample of 575 people (sample B in Table 1), out of which 311 return to UI benefits. Table 1 shows descriptive statistics on selected individual characteristics in the two samples: individuals who report sick are, on average, older, less educated, and have been sick and unemployed to a greater extent during the previous year, compared with the total sample of the unemployed. The proportion of women is also higher in the sample of sick.

Table 1 Sample characteristics (means)

	Sample A: unemployed	Sample B: sick
Demographics		
Age	34.6	38.8
Female	0.580	0.619
Non-Nordic citizen	0.118	0.144
Married	0.314	0.353
Children, age 15 or younger	0.336	0.362
Children, age 16 or older	0.049	0.064
Length of education		
Compulsory	0.201	0.304
Upper secondary, max 2 years	0.381	0.409
Upper secondary, 3-4 years	0.206	0.139
University	0.207	0.143
Missing	0.005	0.005
Type of education		
General	0.275	0.365
Aesthetic, classical	0.043	0.028
Pedagogic	0.046	0.033
Administration, trade	0.118	0.179
Industrial, handicraft	0.205	0.186
Transport, communication	0.013	0.019
Social and health care	0.121	0.093
Agriculture, woods, fishing	0.018	0.014
Service, civil guard, military	0.047	0.042
Missing, non-assignable	0.045	0.040
UI benefits, 1 year prior		
None	0.484	0.469
1-50 days	0.247	0.129
51-100 days	0.128	0.127
More than 100 days	0.141	0.275
UI benefits, 2 years prior		
None	0.485	0.352
1-50 days	0.180	0.111
51-100 days	0.139	0.113
More than 100 days	0.276	0.424
Basic amount, 1 (2) year(s) prior	0.007 (0.004)	0.002 (0.002)
SI benefits, 1 year prior		
None	0.810	0.502
1-50 days	0.140	0.315
51-100 days	0.026	0.075
More than 100 days	0.024	0.108
No. of individuals	12,538	575

Table 2 presents some characteristics of the pre-unemployment wage distributions, based on the information collected from AKSTAT. With respect to wages, the samples are very similar, implying that individuals with wages high enough to benefit from reporting sick are not over-represented among the sick in the raw data.

Table 2 Previous wage characteristics

	Sample A: unemployed	Sample B: sick
Monthly wage (MW), mean	14,392	14,194
Proportion of individuals with:		
MW ≤ 15,950	0.685	0.699
15,950 < MW ≤ 22,750/23,250*	0.291	0.273
MW > 22,750/23,250*	0.024	0.028

Note: In AKSTAT, information on previous wages is reported either as an hourly, daily, weekly or monthly wage and marked with a code that indicates the type of wage. The variable monthly wage (MW) is then calculated according to this formula: MW = (22/5)*weekly wage; MW = 22*daily wage; MW = 22*8*hourly wage. Due to incorrect types of wage codes, some observations of MW are clearly too high. So in the empirical analysis, observations with absurdly high wages are excluded. The limit is set to SEK 50,000 per month, but even other specifications are tested without any significant effect on the results

* The limit for maximum SI benefits was SEK 22,750 in 1998 and SEK 23,250 in 1999.

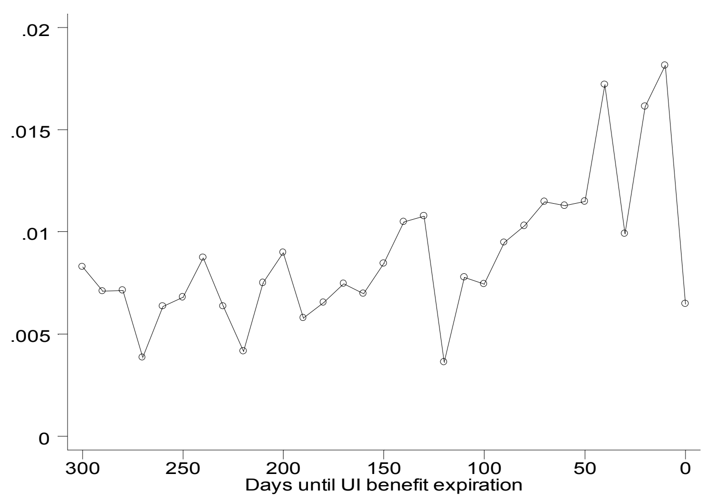
Besides wages, a variable of main interest is the number of days until the expiration date of the UI benefits at the start of unemployment and sick spells. Table 3 reveals considerable variation in that regard: nearly half of the unemployment spells start with less than 270 benefit days remaining.

Figure 3 presents the evolution of the empirical hazard rate for changing to SI benefits with respect to the number of days until the UI benefits expire. Note that time measures the distance to the expiration date. There is an upward trend in the transition rate, indicating a growing tendency to report sick as the expiration date approaches.

Table 3 UI and SI spell characteristics

	Sample A: UI spells	Sample B: SI spells
Proportion of spells lasting more than:		
1 week	84.4	62.6
4 weeks	61.8	38.4
8 weeks	45.4	26.6
12 weeks	30.1	21.6
26 weeks	11.1	12.7
52 weeks	2.1	6.4
Proportion of spells that start with No. of days until UI benefit expiration:		
Less than 31 days	2.8	11.0
31-90 days	5.9	13.2
91-150 days	8.9	14.8
151-210 days	11.8	19.8
211-270 days	17.7	22.8
More than 270 days	53.0	19.5
Transition to SI benefits no. (%)	575 (4.6)	
Transition to UI benefits no. (%)		311 (54.1)
Censored	2.9	13.9
No. of spells	12,538	575

Figure 3 Transition rates to SI benefits



Finally, sick reports vary remarkably over a year. Figure 4 presents the number of sick reports among the unemployed during each month of 1999, divided by the average stock of unemployed people that month, *relative* to sick reports in January. The dotted line represents the total number of sick reports, again relative to January, of both employed and unemployed people. The figure reveals similar patterns for both groups: sick-report rates are highest between January and March and lowest during the summer months.

Figure 4 Seasonal variations in sick reports

Note: Data are obtained from the SFR that are included in the LINDA database. The number of sick reports among the unemployed is calculated as (number of direct flows from UI to SI in a month)/(average stock of UI recipients each week that month). The number of sick reports in January 1999 was 9,425 in the entire LINDA population, and 376 among the UI recipients.

5 Empirical analysis

5.1 Identification strategy

The empirical analysis consists of two parts: (1) the transition from UI to SI benefits and (2) the return from SI to UI benefits, i.e. the length of the sick period. The empirical strategy is to analyse data in terms of a discrete hazard model. The discrete hazard function is given by

$$h(t|x, UIdays, wage) = \Pr(T = t|T \geq t, x, UIdays, wage), \quad t = 1, \ldots, k-1 \qquad (12)$$

where $T = t$ denotes failure in the $[t\text{-}1, t)$ interval. $h(t|x, UIdays, wage)$ is thus the conditional probability of failure in that interval, given that the interval is reached and given a vector of time-constant covariates *x*, the number of days until the UI benefits expiration *UIdays*, and previous wage that determines the level of UI and SI benefits; *k* is the maximum spell length.[15] First, when focus is on the transition from UI to SI benefits, time measures the length of the UI spell, and failure is exit from UI to SI benefits. When focus is on the transition back to unemployment, time measures the length of the SI spell, and failure is exit from SI to UI benefits.

The effect of the UI benefit expiration is identified by the variation in the initial number of benefit days at the start of each unemployment spell. This variation allows us to separate the expiration effect from the duration of the unemployment spell. Thus the number of days until benefit expiration, *UIdays*, is included in the hazard function for UI spells as a time-variant variable, diminishing by one for each day of unemployment. Moreover, in the hazard for SI spells, I include the number of remaining days at the start of the spell as a time-invariant variable. In the equation for transition from UI to SI, we would expect the parameter estimate of *UIdays* to be negative: the more days that are left until expiration, the smaller the probability of sick reports. On the contrary, in the equation for transition from SI to UI, *UIdays* is expected to obtain a positive sign.

The strong connection between income and health as documented in a series of studies makes it difficult to identify the effect of differing benefit ceilings.[16] As discussed in the theoretical section, we would expect a higher probability of sickness for people above the UI benefit ceiling due to economic incentives. But higher income is shown to imply better health for the individual, indicating a lower probability of sickness for those above the ceiling. A challenge for the empirical strategy is thus to separate the *incentive* or *ceiling effect* from the *health effect*.

[15] For an overview of duration models, see e.g., Fahrmeier and Tutz (1994), Lancaster (1990) and Kiefer (1988).

[16] For a summary of studies concerning the interplay between health and labour market outcomes, see Currie and Madrian (1999).

The general identification strategy I use is to let the effect of previous wages vary below and above the UI benefit ceiling. Recall from Figure 1 that the samples could be divided into three categories on the basis of the potential benefits from a SI period. In wage categories I and III, a change in wage does not alter the benefits from reporting sick in relation to UI benefits, whereas in category II, the benefits from a sick period increase as wages increase.

Previous wages are included in hazard equations as a spline function with knots at the threshold values that equal to the ceiling values for UI and SI benefits. Thus consider the following equation of the hazard rate $h(t)$:

$$h(t) = h_0(t)\exp\begin{pmatrix} f(x, z(t), \Omega) + \alpha UIdays + \beta wage + \gamma_{II} D^{II} \\ + \delta_{II} D^{II} wage + \gamma_{III} D^{III} + \delta_{III} D^{III} wage \end{pmatrix}, \tag{13}$$

where $h_0(t)$ is the baseline hazard at time t, and $f(.)$ is a function of the time-invariant covariates x and time-varying covariates $z(t)$. D^{II} and D^{III} are dummies for the wage categories, such that $D^{II} = 1$ if wage > SEK 15,950 = w_{II}^*, and $D^{III} = 1$ if wage > SEK 22,750 = w_{III}^* during 1998, wage > SEK 23,250 = w_{III}^* during 1999. Moreover, as shown in Figure 1, there are no discrete jumps at the threshold values in the difference between UI and SI benefits, and thus the spline function is restricted to be continuous. In other words, the segments are required to join at the knots, implying

$$h\left(w_{II}^* \middle| D^{II} = 0\right) = h\left(w_{II}^* \middle| D^{II} = 1\right), \text{ and} \tag{14a}$$

$$h\left(w_{III}^* \middle| D^{III} = 0\right) = h\left(w_{III}^* \middle| D^{III} = 1\right). \tag{14b}$$

Equations (14a) and (14b) imply linear restrictions on the parameters β, δ_{II} and δ_{III}. Inserting the restrictions into equation (13), the hazard equation can be written as:

$$h(t) = h_0(t)\exp\begin{pmatrix} f(x, z(t), \Omega) + \alpha UIdays + \beta wage \\ + \delta_{II} D^{II}\left(wage - w_{II}^*\right) + \delta_{III} D^{III}\left(wage - w_{III}^*\right) \end{pmatrix}, \tag{15}$$

where β captures the wage effect for individuals with wages in category I; $(\beta + \delta_{II})$ for those in category II; and $(\beta + \delta_{II} + \delta_{III})$ for those in category III.

(Wage - w^*_{III}) is included in the estimations as a time-variant variable to allow for the discrete change in the ceiling value of w^*_{III} from 22,750 to 23,250 in the turn of the year 1998-1999.

The model is estimated in discrete time, assuming that both the hazard and the factors do not change within each time-interval. The log-likelihood function, for *n* random observations, can be written as

$$\ln L(\varpi_1,\varpi_2,\alpha,\beta,\delta_{II},\delta_{III},\eta)=$$

$$\sum_{i=1}^{n}\left\{c_i \ln\left[1-\exp\left[-\exp\begin{pmatrix} x_i\varpi_1 + z_i(t)\varpi_2 + \alpha UIdays_i \\ +\beta wage_i + \delta_{II} D_i^{II}\left(wage_i - w^*_{II}\right) \\ +\delta_{III} D_i^{III}\left(wage_i - w^*_{III}\right) + \eta(t_i) \end{pmatrix}\right]\right]\right. \tag{16}$$

$$\left. -\sum_{s=1}^{t_i}\exp\begin{pmatrix} x_i\varpi_1 + z_i(t)\varpi_2 + \alpha UIdays_i + \beta wage_i \\ +\delta_{II} D_i^{II}\left(wage_i - w^*_{II}\right) + \delta_{III} D_i^{III}\left(wage_i - w^*_{III}\right) + \eta(s) \end{pmatrix}\right\},$$

where $\eta_t = \ln \int_t^{t+1} h_0(u)du$. In the first part of the analysis, c_i = 1 indicates the transition to SI benefits; in the second part, a return to UI benefits. The function is maximised with respects to its arguments.[17] The baseline hazard from UI to SI is estimated for time-intervals of 4 weeks up to 16 weeks.[18]

Besides the specification shown in equation (16), a specification with two splines is estimated, implying $D^{III} = 0$, such that the two categories, II and III, that imply a possibility to gain from a SI period, are treated as one.

5.2 Empirical results

Table 4 reports the estimated results for the transition from UI benefits to SI benefits. Appendix B presents the estimates for the baseline hazard. The four first lines in the table present the variables of chief interest: β, δ_{II} and δ_{III}, which

[17] This model is found, e.g., in Carling et al. (1996) and with minor modifications in Andersson and Vejsiu (2001). Asymptotic standard errors are calculated by using the BHHH estimator.

[18] The time intervals in the baseline hazard from SI to UI are 2, 4, and 4 weeks up to 10 weeks. In the UI period data, one week corresponds to 5 days, and in the SI period data, one week corresponds to 7 days.

are the components for the estimated wage effects in the three intervals; and *days until UI expiration*. Columns (1)-(3) report results for a specification with two splines – all individuals who can benefit from reporting sick are treated as one – whereas results for a specification with different splines for those below and above the SI ceiling are presented in column (4).

The parameter estimates for β, δ_{II} and δ_{III} indicate that there is a difference in the effect of wages on the hazard to SI benefits between individuals with wages below and above the ceiling for UI benefits. An increase in wages of SEK 1,000 implies a decrease in the sickness rate with 3.2-4.1 % for individuals with a wage below the UI benefit ceiling, whereas for those above the ceiling, the effect of wage increases on the transition rate to SI, ($\beta + \delta_{II}$), is non-existent as long as the group above the ceiling is treated as one.[19]

Introduction of the third spline provides further support for the incentives effect: the wage effects are shown to be positive, but only for the group with wages above the UI ceiling, but below the SI ceiling. The parameter estimates in column (4) imply that for this group, an increase in wages by SEK 1,000 increases the sick-report rate by about 7.5 %. For people above the SI ceiling, the sick rate decreases by slightly more than 6 % due to a corresponding wage rise.

This result is expected: people with wages between the ceilings are the only ones whose SI benefits increase in relation to UI benefits as wages increase. For people in the highest and lowest wage categories, the surplus between SI and UI benefits is not changed by a wage increase. Consequently, for these groups, the wage effect should only consist of the health effect, and thus be estimated negative.

For the benefit expiration effect, the results also correspond to what the theoretical discussion implied. The estimated effect of a 10 more days until the benefit expiration varies between –0.034 and –0.038, which implies that being 10 days closer to expiration is associated with about a 3-4 % higher sick-report rate. Statistically, this effect is highly significant and robust across the specifications.

[19] The percentage effect is calculated as $100 * \frac{\lambda * - \lambda}{\lambda} = 100 * [\exp(n\beta_X) - 1]$, where $\lambda* - \lambda$ is the difference in the hazard rate when the variable X is increased by *n* units.

Among the other variables, a person's SI benefit history is a strong, significant factor in explaining the sick-report rate. Those with 1-50 sick days before the actual unemployment spell during the last year are almost three times as likely to report sick as individuals who never had sick days. Moreover, an increase in the number of sick days is associated with a higher sick-report rate.

In contrast with previous sick days, having any UI benefits during the last year is associated with the same, or slightly lower, sick-report rate as compared to no unemployment days at all. This, together with the clearly negative estimate for days until benefit expiration, supports the hypothesis that it is not unemployment *per se* that increases the sick-report rate, but the approaching expiration date.

As in many previous studies, the sick-report rate is found to be increasing for people who are older, and higher for women than for men. The results indicate further that non-Nordic citizens have lower sick-report rates, though the parameter estimate is not statistically significant.

The regional dummies capture high sick rates in the northern parts of Sweden, as reported in Appendix B. In relation to other counties, living in a *forest county* increases the expected sick-report rate of an unemployed person by more than 60 %. Results for the seasonal dummies are similar to Figure 4: the probability of the transition to SI benefits is highest early in a year. Among the demographic variables, marital status and the existence of children do not appear to play an important role for sick reports.

Finally, none of the educational variables in columns (4) and (5) turns out to play a significant role. This is somewhat surprising, because education level should reflect the socio-economic status of the individual, which in turn is shown to be positively correlated with health (as shown in a series of previous studies). What may be less surprising is that the type of education does not have a significant effect: it is mainly included as a proxy for the industry that the individual worked for before unemployment, but the correlation between them is probably very low.

Table 4 Estimated results, transition to SI benefits. Standard errors in italics.

	(1)	(2)	(3)	(4)
Wage effect (SEK 1,000):				
β	-.033 *.014*	-.037 *.014*	-.035 *.015*	-.042 *.015*
δ_{II}	.033 *.028*	.045 *.028*	.055 *.029*	.114 *.039*
δ_{III}	-	-	-	-.135 *.069*
Days until UI expiration (10 days)	-.034 *.005*	-.035 *.005*	-.038 *.005*	-.038 *.005*
Regional dummies*	yes	yes	yes	yes
Dummies for quarter of inflow*	yes	yes	yes	yes
Demographic characteristics				
Age		.032 *.005*	.024 *.005*	.023 *.005*
Female		.414 *.129*	.388 *.132*	.411 *.133*
Non-Nordic citizen		-.099 *.136*	-.176 *.137*	-.171 *.137*
Married		-.310 *.181*	-.293 *.184*	-.289 *.185*
Married and female		.233 *.210*	.301 *.213*	.296 *.213*
Children, age 15 or younger		.058 *.175*	.072 *.173*	.078 *.177*
Children, age 15 and female		.055 *.207*	-.022 *.208*	-.029 *.210*
Children, age 16 or older		.264 *.305*	.373 *.308*	.342 *.308*
Children, age 16 and female		-.348 *.378*	-.497 *.397*	-.462 *.379*
Length of education				
Compulsory		.234 *.204*	.143 *.206*	.145 *.206*
Upper secondary, max 2 years		ref.	ref.	ref.
Upper secondary, 3-4 years		-.215 *.141*	-.127 *.143*	-.130 *.143*
University		-.459 *.153*	-.262 *.155*	-.273 *.155*
Missing		.084 *.635*	.389 *.206*	.400 *.643*
Type of education*		yes	yes	yes
UI benefits, 1 year prior				
1-50 days			-.572 *.159*	-.580 *.159*
51-100 days			-.271 *.162*	-.282 *.162*
More than 100 days			-.015 *.135*	-.028 *.155*
UI benefits, 2 years prior				
1-50 days			-.036 *.165*	-.019 *.166*
51-100 days			-.069 *.162*	-.060 *.162*
More than 100 days			.147 *.135*	.166 *.135*
Basic amount, 1 (2) year(s) prior*			Yes	yes
SI benefits, 1 year prior				
1-50 days			1.06 *.100*	1.07 *.101*
51-100 days			1.24 *.170*	1.25 *.170*
More than 100 days			1.77 *.147*	1.79 *.147*
Log-likelihood	-4,520	-4,464	-4,342	-4,340

* Results reported in Appendix B.

Turning to the second part of the empirical analysis, Table 5 reports the estimated results for the return rates from SI to UI benefits. Appendix B presents estimates for the baseline hazard. Again, the variables of main interest are the three wage variables and the days until the UI benefits expire.

The hypothesis that being above the maximum UI benefit level would imply longer SI spells cannot be accepted; if anything, it should be rejected. Though statistically insignificant, a positive point estimate of δ_{II} implies that the estimated effect of wages may be more positive above, rather than below, the UI ceiling. This indicates that an increase in the wage is associated with either the same or a relatively higher return rate – and thus shorter SI spell – for those who would gain from having a relatively longer SI spell.

The benefit-expiration effect is estimated positive as expected. But with such large standard errors, the hypothesis – that having fewer days left until expiration is associated with longer SI spells – cannot be accepted either.

Among the other variables, only age seems to have a statistically significant effect on the length of a SI spell: an extra year implies about a 2 % lower probability of returning to UI benefits. Standard errors for all other parameter estimates are very large. Thus based on these results, the general conclusion is that very little can be said about what influences the length of a sick spell during unemployment. Why is that?

The relatively small sample size of about 600 people is a potential explanation. But I consider it difficult to increase the sample size even if the data contain information about several sick spells. For the purpose of this study, which is to examine the interplay between UI and SI systems, I want to be sure that UI benefits are the alternative income source for the sick person. Thus I am only interested in those sick spells preceded by insured unemployment. Table A1 in the Appendix shows data that include 3,769 such people. But I see an advantage in terms of reducing heterogeneity by using the same sample to study both the transition from UI to SI, and vice versa. After all, the question is how the structure of the insurance systems affects the probability of *both* becoming sick and staying sick. A potential subject for future studies is however to apply another sampling method to analyse the length of an SI spell separately from it's probability of occurrence.

Table 5 Estimated results, transition to UI benefits. Standard errors in italics.

	(1)	(2)	(3)	(4)
Wage effect (SEK 1,000):				
β	.008 *.020*	.006 *.021*	.006 *.022*	.006 *.022*
δ_{II}	.008 *.039*	.034 *.039*	.031 *.040*	.028 *.040*
δ_{III}	-	-	-	.007 *.088*
Days until UI expiration (10 days)	.004 *.006*	.002 *.006*	.005 *.007*	.005 *.007*
Regional dummies*	yes	yes	yes	yes
Dummies for quarterly inflow*	yes	yes	yes	yes
Demographic characteristics				
Age		-.017 *.007*	-.016 *.007*	-.016 *.007*
Female		-.082 *.182*	-.080 *.187*	-.082 *.189*
Non-Nordic citizen		-.104 *.187*	-.114 *.188*	-.115 *.188*
Married		-.282 *.269*	-.294 *.272*	-.293 *.274*
Married and female		.283 *.307*	.307 *.310*	.305 *.311*
Children, age 15 or younger		.147 *.235*	.155 *.240*	.152 *.245*
Children, age 15 and female		.035 *.281*	.023 *.288*	.023 *.288*
Children, age 16 or older		.663 *.403*	.652 *.404*	.654 *.404*
Children, age 16 and female		-.741 *.501*	-.694 *.505*	-.695 *.505*
Length of education				
Compulsory		-.090 *.274*	-.078 *.276*	-.077 *.276*
Upper secondary, max 2 years		ref.	ref.	ref.
Upper secondary, 3-4 years		-.075 *.203*	-.110 *.206*	-.109 *.206*
University		.085 *.200*	.063 *.203*	.064 *.203*
Missing		-1.34 *1.08*	-1.34 *1.08*	-1.34 *1.08*
Type of education		yes	yes	yes
UI benefits, 1 year prior				
1-50 days			.074 *.206*	.074 *.206*
51-100 days			.186 *.197*	.186 *.197*
More than 100 days			.081 *.160*	.081 *.160*
SI benefits, 1 year prior				
1-50 days			-.088 *.139*	-.089 *.139*
51-100 days			.240 *.256*	.240 *.256*
More than 100 days			-.335 *.230*	-.336 *.230*
Log-likelihood	-1,529.00	-1,516.58	-1,513.90	-1,513.89

Note*:* Due to a small sample size, a reduced number of control variables were included. So dummies for UI benefits two years prior and basic amount benefits, which did not turn out to be statistically significantly in Table 4, were excluded.

5.3 How robust are the results?

One of the key concerns in this study is identification of the ceiling effect: are the sick-report rates higher and subsequent sick periods longer for people with wages above the threshold value? The chosen strategy is to let the effect of wages vary between different wage categories, both below and above the threshold as defined by the institutional framework. Concerning the transition from UI to SI, the results show a significant difference, which is then taken as evidence for the ceiling effect on the probability of sickness among the unemployed.

To check the robustness of this result, I estimated specifications with various threshold values and report the results in Table 6. To begin with, I estimate a specification with the two *old* knots at the ceiling values, plus two additional thresholds: one below the UI ceiling at a wage equal to SEK 10,950; and one between the UI and SI ceilings at a wage equal to SEK 18,950. The results in column two support the original results for the three spline specifications in column one: the threshold values equal to the UI and SI ceilings are the most important for the variation in the wage effect. The parameter estimates in column two are no longer statistically significant, but nevertheless, they indicate that the wage effect is more positive in the interval between the two ceilings than outside of it.

Columns three to five present estimated wage effects in two spline specifications when the threshold is varied within the interval (14,950; 16,950). We would expect the difference between the wage effects to be smaller for threshold values that are slightly below or above the true ceiling value of 15,950, because the groups are *contaminated*. But this is not the case: the estimated wage effects are more or less the same in all three columns. How should this be interpreted?

The rules for the UI and SI benefit payments provide a potential explanation. UI compensation is paid out for workdays only, with a maximum of five days a week. The sum of annual earnings, divided by the sum of workdays per year, determines the size of the daily UI compensation. SI benefits, however, are paid out seven days a week, with the size determined by the sum of the annual wage divided by 365. Consequently, the amount of received SI benefits depend on whether the sick period lasts over a weekend or not. For example, compensation from SI is higher for a sick period from Thursday until Monday, than from Monday until Wednesday, even though the number of workdays – and thus the lost UI benefits – are the same.

The crucial consequence of these rules – which can explain the results in Table 6 – is that even unemployed people with previous wages below SEK 15,950 may benefit from sick periods that last for more than a weekend, whereas people with previous wages that are slightly above the ceiling do not benefit from sick periods that fall during the middle of the week.[20]

Table 6 Wage effects with various threshold values (TV), transition to SI benefits. Standard errors in italics.

	Several splines:		Two splines:		
	(1) TV_{III}=15,950 TV_V=22,750* (column 4, Table 4)	(2) TV_{II}=10,950 TV_{III}=15,950 TV_{IV}=18,950 TV_V=22,750*	(3) TV=14,950	(4) TV=15,950 (column 3, Table 4)	(5) TV=16,950
Wage effect (SEK 1,000):					
β	-.042 *.015*	-.041 *.028*	-.039 .016	-.035 *.015*	-.032 *.014*
δ_{II}		-.003 *.053*	.056 *.028*	.055 *.029*	.054 *.030*
δ_{III}	.114 *.039*	.128 *.084*			
δ_{IV}		-.026 *.126*			
δ_V	-.135 *.069*	-.116 *.117*			
No. of observations	12,538	12,538	12,538	12,538	12,538

6 Concluding remarks

This paper focuses on the interplay between unemployment insurance and sickness insurance, two major parts of Sweden's social insurance system. The specifications of these two insurance programs provide possibilities for benefit arbitrage: by reporting sick, an unemployed person with previously high wages receives an SI benefit that is higher than an UI benefit. The empirical analysis presents some evidence for the arbitrage hypothesis: an increase in wages seems to have a different effect on the sick-report rate for unemployed people

[20] The data do not include that many sick spells that occur over the weekend. Among the unemployed, Tuesday seems to be the most usual day to report sick, and Friday is the day when sick spells seem to end. Among the employed, sick spells start more often on Monday and end on Friday. See Johansson and Palme, (2000).

who can benefit from reporting sick, than for those who cannot. But no such difference is found for the length of a sick spell.

A wage increase has a significantly negative effect on the sick-report rate for low-wage earners (those below the threshold for maximum UI benefits) and high-wage earners (those above the threshold for maximum SI benefits). This reflects the well-known correlation between high income and good health. But for people whose wages fall between these two thresholds, the wage effect on the sick-report rate is clearly positive. This is the only group whose relative compensation of SI compared to UI benefits increase as wages increase.

Thus given that the connection between health and income is strong for all wage levels, the statistically significant difference in the estimated slope concerning the sick-report rate can be interpreted as evidence for an incentive effect that works in the opposite direction from the health effect. To my knowledge, no previous studies have found that the health effect (the positive correlation between health and wages) would only exist for the lowest and highest wage levels but not for middle wages. Thus I find it plausible to conclude that the unequal structure of these two insurance systems seems to imply an increase in the number of sick reports.

I do not, however, find evidence for such an incentive effect that would lengthen the sick periods. In other words, economic incentives seem to play a different role for the choice to *stay* on SI benefits than for the choice to *switch* to SI benefits. It may be that the increased benefit from collecting SI lowers the threshold for a few days' sick period due to minor illness, thereby decreasing the average length of SI periods. After all, regional social insurance offices require a doctor's certificate to pay out more than a week's worth of compensation, which implies that it may be difficult to let other factors besides health determine the length of a SI spell.

But all of the parameter estimates in the model have very large standard errors, possibly due to a relatively small sample size. So very little can be said about what determines the length of a sick spell. Thus a subject for future research is to analyse the length of a sick spell in more detail, using a larger sample, and separate from the probability of occurrence.

Furthermore, the empirical analysis clearly demonstrates that the probability of a sick report increases the closer a person is to the expiration date of UI benefits. The economic explanation is that SI benefits are used as means to save UI benefit days, and thus, to postpone the drop in income after all of the UI benefit days are used. The need to postpone becomes more obvious as the expiration date approaches, thereby increasing the willingness to report sick on the few UI benefit days that remain.

Of course, the approaching drop in income may cause stress, which in turn may have effects on the person's actual health. Thus the possibility that at least some part of the increase in sick reports is explained by increased illness cannot be excluded. Nevertheless, the result adds to the practically non-existent knowledge on sickness behaviour among the unemployed in Sweden.

But one should note that this study is a partial equilibrium analysis. The results do not indicate how the total number of sick reports would change if the benefits were harmonised, and neither can they be used to predict the effect of a changed duration of UI benefits on statistics about sickness among the unemployed. Such extensive reforms would most likely have effects on many transitions in the labour market, besides those between UI and SI. The *economic significance* of the results is thus not obvious.

In sum, this study serves above all as a first glance at the data, pointing to some interesting patterns in the behaviour of the unemployed. More analysis, both theoretical and empirical, is still needed before we can draw distinct conclusions about which mechanisms cause this behaviour. A more thorough analysis of the duration of SI periods, a comparative study of SI periods among the unemployed and employed workers, and development of a theoretical model are examples of topics for future work.

References

Allen, S G (1981), An Empirical Model of Work Attendance, *The Review of Economics and Statistics*, 71, 77-87.

Andersson, F, and A Vejsiu (2001), Determinants of plant closures in Swedish manufacturing, Working Paper 2001:6, Institute for Labour Market Policy Evaluation.

Barmby, T A, C Orme, and J G Treble (1991), Worker Absenteeism: an Analysis Using Microdata, *Economic Journal*, 101, 214-229.

Barmby, T A, J Sessions, and J G Treble (1994), Absenteeism, Efficiency Wages and Shirking, *Scandinavian Journal of Economics*, 96, 561-566.

Broström, G, P Johansson, and M Palme (1998), Assessing the Effect of Economic Incentives on Incidence and Duration of Work Absence, working paper series in Economics and Finance, no. 288, Stockholm School of Economics.

Brown, S, and J G and Sessions (1996), The Economics of Absence: Theory and Evidence, Journal of Economic Surveys, 10, 23-53.

Burdett, K (1979), Unemployment Insurance as a Search Subsidy: A Theoretical Analysis, *Economic Inquiry*, 17, 333-343.

Carling, K, P-A Edin, A Harkman and B Holmlund (1996), Unemployment Duration, Unemployment Benefits, and Labor Market Programs in Sweden, *Journal of Public Economics*, 59, 313-334.

Carling, K, B Holmlund, and A Vejsiu (2001), Do benefit cuts boost job finding? Swedish evidence from the 1990s, *Economic Journal*, October 2001, 766-790.

Cassel, C-M, P Johansson and M Palme (1996), A dynamic discrete choice model of blue collar absenteeism in Sweden 1991, Umea Economic Studies, 425, Umea University.

Currie, J and B C Madrian (1999), Health, Health Insurance and the Labor Market, in Ashenfelter, O and D Card (eds), *Handbook of Labor Economics*, Volume III.

Edgerton, D, and C Wells (2000), A model for the analysis of sick leave in Sweden Inference using the HUS data, mimeo, Lund University.

Edin, P-A and P Fredriksson (2001), LINDA - Longitudinal INdividual DAta for Sweden, Working Paper 2001:6, Department of Economics, Uppsala University.

Fahrmeier, L, and G Tutz (1994), *Multivariate Statistical Modelling Based on General Linear Models*. Springer.

Henrekson M, and M Persson (2001), The Effects of Sick Leave in Changes in the Sickness Insurance System, SSE/EFI Working Paper, 444, Stockholm School of Economics.

Johansson, P, and M Palme (1996), Do economic incentives affect work absence? Empirical evidence using Swedish micro data, *Journal of Public Economics*, 14(1), 161-194.

Johansson, P, and M Palme (2000), Assessing the Effect of Public Policy on Worker Absenteeism, forthcoming in *Journal of Human Resources*.

Kiefer, N M (1988), Economic Duration Data and Hazard Functions, *Journal of Economic Literature*, 26, 646-679.

Krueger, A B, and B D Meyer (2001), Labor Supply Effects of Social Insurance, forthcoming in Auerbach, A and M Feldstein (eds), *Handbook of Public Economics*.

Lancaster, T (1990), *The Econometric Analysis of Transition Data.* Cambridge University Press.

Mortensen, D (1977), Unemployment Insurance and Job Search Decisions, *Industrial and Labor Relations Review*, 30, 505-517.

Mortensen, D (1990), A Structural Model of Unemployment Insurance Benefit Effects on the Incidence and Duration of Unemployment, in Y Weiss and G Fishelson (eds), *Advances in the Theory and Measurement of Unemployment*, Macmillan.

Sianesi B (2001), An evaluation of the active labour market programmes in Sweden, Working Paper 2001:5, Institute of Labour Market Policy Evaluation.

Van den Berg, G (1990), Nonstationarity in Job Search Theory, *Review of Economic Studies*, 57, 255-277.

Van den Berg, G (1994), The Effects of Changes of the Job Offer Arrival Rate on the Duration of Unemployment, *Journal of Labor Economics*, 12, 478-498.

Appendix A

Sample construction

Table A1 illustrates the various steps in the sampling procedure. First, people observed using AKSTAT during the 1998-1999 study period are collected. The spells observed in AKSTAT are open unemployment with income-related UI benefits (*BERSTYP*=2), open unemployment with basic amount (*BERSTYP*=12), uncompensated qualifying period of five days (*BERSTYP*=1), or participation in these four active labour market programmes: work experience scheme (*arbetslivsutveckling ALU, BERSTYP*=3 or 13); temporary public work for older people (*offentligt tillfälligt arbete OTA, BERSTYP*=4, 14 or 44); project work (*projektarbete, BERSTYP*=6 or 16); and temporary severance pay (*tillfälligt avgångsersättning TAE, BERSTYP*=7, 17 or 23). Thus far, no regard is paid to the type of spell.

From the beginning, it is required that they are included in LINDA for all three years – 1997, 1998 and 1999 – to maximise chances to be able to observe their previous UI spells. The sample of 33,436 people with at least one spell during 1998-1999 is then merged with SFR (*SJUKFALLSREGISTRET*) by using the personal ID code (*BIDNR*) common to AKSTAT, SFR, and LINDA.

During 1998-1999, 10,680 people were observed with AKSTAT and SFR. But most cases, UI and SI spells are not directly connected to one other: only 4,650 spells have a direct transition from AKSTAT to SFR, and only 3,769 have changed from open unemployment with UI benefits (*BERSTYP*=2) to SI benefits. No regard is paid to the type (*FALLKOD*) or extent of the SI benefits. *FALLKOD* takes these values: (1) for regular SI benefits for illness; (3) for rehabilitation; (4) for preventive SI benefits; (5) for SI benefits for students; and various combinations of all of these. The extent of SI benefits is either (1) full-time, (3) three-quarters, (2) half-time or (4) one-quarter.

Between 5 January 1998 and 3 September 1999, 17,951 people have a UI spell as openly unemployed (hereafter referred to as UI spell), and sooner or later, about 4.6 % of these people change directly to SI benefits. But as reported in Table 1, the sample size is diminished by 5,413 persons, resulting in a sample size of 12,538 UI spells, out of which 575 include a transition to SI benefits.

Table A1 Sample construction

No. of people observed in AKSTAT during 1998-1999		33,436
No. of people observed in both AKSTAT and SFR during 1998-1999		10,680
No. of people with at least one transition from AKSTAT to SI benefits		4,650
No. of people with at least one transition from open unemployment with UI benefits (*BERSTYP*=2) to SI benefits		3,769
No. of transitions from AKSTAT to SI benefits		7,421
No. of transitions from open unemployment with UI to SI benefits		5,341
	No. of spells	No. of spells with exit to SI
UI spell starting 5 January 1998 – 3 September 1999	17,951	829
Sample size after following exclusions:		
UI or SI spell history 1994-1997 incorrect	17,801	818
Impossible to calculate *days until UI expiration*, decision not traced back to 1994-1997 AKSTAT	16,913	767
Days until UI expiration negative	15,908	707
Days until UI expiration more than 450	15,870	701
UI spell length non-positive	13,691	687
450 allowed days (for people 54/57 years of age or older)	12,633	576
Days until UI expiration more than 310	12,569	575
Previous wage higher than SEK 50,000**	12,538	575

Note*:* I collected only people who are included in all three LINDA samples from 1997-1999. Most of the LINDA sample is unchanged from year to year, but a small fraction is replaced because some people die or emigrate, and new cohorts and immigrants are collected into the sample.

* Until now, I have not applied an age restriction. The age varies between 18 and 66 years.

** Specifications where previous wages are imputed, instead of excluding the 31 observations, produce identical results.

Appendix B

Table B1 Estimates for the baseline hazard, educational, regional and seasonal variables, transition to SI benefits. Standard errors in italics.

	(1)	(2)	(3)	(4)
Regional dummies*:				
City county	-.059 *.097*	.012 *.100*	.043 *.101*	.049 *.101*
Forest county	.381 *.118*	.457 *.121*	.491 *.122*	.496 *.122*
Other	ref.	ref.	ref.	ref.
Quarter of inflow into UI:**				
January-March	.296 *.097*	.286 *.100*	.139 *.104*	.139 *.104*
April-June	ref.	ref.	ref.	ref.
July-September	.122 *.124*	.196 *.127*	.156 *.131*	.153 *.131*
October-December	.311 *.162*	.398 *.165*	.291 *.176*	.280 *.176*
Type of education:				
General		ref.	ref.	ref.
Aesthetic, classical		-.217 *.328*	-.204 *.330*	-.212 *.331*
Pedagogic		.246 *.314*	.193 *.315*	.192 *.315*
Administration, trade		.099 *.204*	.040 *.206*	.037 *.206*
Industrial, handicraft		.118 *.207*	-.017 *.209*	-.036 *.209*
Transport, communication		.336 *.362*	.270 *.366*	.274 *.366*
Social and health care		.028 *.230*	-.018 *.209*	-.016 *.232*
Agriculture, woods, fishing		.096 *.407*	.091 *.414*	.089 *.415*
Service, civil guard, military		-.089 *.278*	-.141 *.281*	-.127 *.281*
Missing, non-assignable		.137 *.289*	-.036 *.298*	-.030 *.298*
Baseline:				
1-20 workdays	-5.50 *.219*	-6.88 *.352*	-6.73 *.378*	-6.67 *.378*
21-40 workdays	-6.40 *.232*	-7.82 *.364*	-7.63 *.388*	-7.57 *.389*
41-60 workdays	-6.78 *.248*	-8.21 *.380*	-8.08 *.401*	-8.02 *.401*
61-80 workdays	-6.78 *.260*	-8.21 *.384*	-8.13 *.408*	-8.08 *.408*
81-418 workdays	-7.05 *.223*	-8.58 *.366*	-8.54 *.383*	-8.48 *.383*
No. of observations	12,538	12,538	12,538	12,538

* City counties are Stockholm, Gothenburg, and Malmö (*LAN*=1, 12, 14). Forest counties are Värmland, Kopparberg, Gävleborg, Västernorrland, Jämtland, Västerbotten, and Norrland (*LAN*=17, 20-25).

Table B2 Estimates for the baseline hazard, educational, regional and seasonal variables, transition to UI benefits. Standard errors in italics.

	(1)	(2)	(3)	(4)
Regional dummies*:				
City county	-.109 *.130*	-.079 *.136*	-.073 *.137*	-.074 *.137*
Forest county	-.002 *.162*	-.075 *.169*	-.092 *.172*	-.093 *.172*
Other	ref.	ref.	ref.	ref.
Quarter of inflow into UI:				
January-March	-.092 *.156*	-.090 *.165*	-.087 *.166*	-.088 *.166*
April-June	ref.	ref.	ref.	ref.
July-September	-.221 *.163*	-.180 *.169*	-.206 *.170*	-.207 *.170*
October-December	-.380 *.164*	-.308 *.171*	-.283 *.172*	-.284 *.172*
Type of education:				
General		ref.	ref.	ref.
Aesthetic, classical		-.188 *.451*	-.156 *.456*	-.157 *.456*
Pedagogic		.172 *.399*	.256 *.401*	.256 *.401*
Administration, trade		-.078 *.290*	-.065 *.290*	-.062 *.291*
Industrial, handicraft		-.127 *.290*	-.116 *.291*	-.115 *.291*
Transport, communication		.377 *.436*	.455 *.439*	.454 *.439*
Social and health care		.198 *.309*	.233 *.311*	.233 *.311*
Agriculture, woods, fishing		-.231 *.644*	-.245 *.649*	-.245 *.649*
Service, civil guard, military		.319 *.366*	.307 *.367*	.307 *.367*
Missing, non-assignable		.377 *.381*	.455 *.390*	.455 *.390*
Baseline:				
1-14 days	-3.25 *.309*	-2.55 *.504*	-2.65 *.516*	-2.65 *.518*
14-28 days	-4.81 *.354*	-4.07 *.538*	-4.17 *.549*	-4.17 *.549*
28-56 days	-5.42 *.381*	-4.64 *.562*	-4.75 *.573*	-4.75 *.573*
56-715 days	-6.75 *.365*	-5.90 *.543*	-6.01 *.561*	-6.01 *.562*
No. of observations	575	575	575	575

* City counties are Stockholm, Gothenburg, and Malmö (*LAN*=1, 12, 14). Forest counties are Värmland, Kopparberg, Gävleborg, Västernorrland, Jämtland, Västerbotten. and Norrland (*LAN*=17, 20-25).